

CLAIMS

1. An article handling apparatus, comprising:

an article storage area for storing in bin-segments groups of articles to be handled;

an article grasping mechanism adapted to be positionable adjacent the article storage area for selectively grasping articles stored therein and removing them from the article storage area; and

a movable article storage structure adapted to be selectively positionable from fully inside to at least partially outside the article storage area, the movable article storage structure comprising:

a plurality of guidance apparatuses, each adapted for individually guiding therealong at least two bin-segments of articles to be handled, so as to form therewith a corresponding plurality of axially aligned article storage columns, and

wherein each guidance apparatus includes a receiving device which provides individual coupling to the bin-segments, so as to allow grouping of the bin-segments into the plurality of axially aligned article storage columns.

2. The article handling apparatus of claim 1, wherein at least two of the guidance apparatuses are coupled together along a longitudinal edge thereof using a hinge device, so as to provide an open and closed position for the hinged guidance apparatus.

3. The article handling apparatus of claim 1 or 2, wherein the guidance apparatus individually guides bin-segments from one end of an article storage column, along the longitudinal axis of the column, and in a direction toward a grasping end of the article grasping mechanism, which article grasping mechanism is positioned adjacent an opposed end of the column.

3. The article handling apparatus of claim 2, wherein each hinged structure includes two rows of article storage columns which are positioned so as to be back-to-back when the hinged structure is closed, and when the hinged structure is opened, access is provided to the columns on both the inside and the outside of the structure.

4. A method of refilling a vending machine with articles to be dispensed, comprising:
, moving at least partially outside of the vending machine an article storage structure having hinged article storage magazines therein, which article storage structure is adapted to be selectively positionable from fully inside to at least partially outside an article storage area of the machine;

opening the hinged structure so as to provide access to interior portions of the article storage magazines;

using prepackaged groups of articles for successively loading respective article storage columns of the article storage magazines with articles while it is at least partially outside the article storage area

closing the hinged structure, and

moving the hinged structure, i.e. by sliding or using wheels, into the storage area of the vending machine.

5. A movable article storage structure adapted to be selectively positionable from fully inside to at least partially outside an article storage area of an article handling device, the movable article storage structure comprising:

5 a hinged combination of at least two bin-segment guidance apparatuses, each guidance apparatus adapted for individually guiding therealong at least two bin-segments of articles to be handled, so as to form therewith a plurality of axially aligned article storage columns, and

10 wherein the guidance apparatus of each hinged structure includes a receiving device which provides individual coupling to the bin-segments, so as to allow grouping of the bin-segments into the plurality of axially aligned article storage columns.

6. The method and apparatus of any preceding claim, further including a weight supporting device coupled between the article storage structure and a support for the article handler, such as a ramp, wheels, a slide, or other guide, to assist the movement of the article storage structure into and out of the storage area.

7. The apparatus of claim 6, wherein that ramp includes one or more raised walls that serve to guide the structure during its movement into and out of the storage area, which walls also serves to protrude into the storage area and reside therein against the storage structure, so as to maintain the storage structure at a predetermined position within the storage area during operation of the article handling apparatus.

8. The method and apparatus of any preceding claim, wherein the guidance apparatus may additionally include a mechanism that co-acts with the bin-segments so as to help enforce a FIFO (First-In-First-Out) ordering of the segments in the column.

9. The method and apparatus of claim 8, wherein such a mechanism includes one-way tabs which prevent the segments from being loaded into the column from the dispensing end.

10. The method and apparatus of claim 8 or 9, wherein flexible dividers are positioned between the columns of segments, so that when a segment is removed from a top of the column, the divider flexes into the space of the column, thereby blocking the insertion of an additional segment into the column from the dispensing end thereof.

11. The apparatus of any preceding claim, wherein the receiving devices comprise openings near the bottom of the guidance apparatus, which openings provide access for respective ones of article storage segments to be admitted into respective ones of the plurality of axially aligned article storage columns.

12. The apparatus of claim 11, where the movable article storage structure comprises a refillable article storage magazine having a 2 by 1+N matrix (where N= 0 or a positive integer), and the openings comprise openings in the bottom of opposed sidewalls that are used to form an outside perimeter for the magazine.

13. The apparatus of claim 11, where the movable article storage structure comprises a refillable article storage magazine having a 2 by 1+N matrix (where N= 0 or a positive integer), and the openings comprise openings in the bottom of the floor of the magazine.
- 5 14. The apparatus of any preceding claim, wherein the magazine includes a bottom portion that functions as a sled or cart, and includes movement facilitating device, such as wheels, so as to assist movement of the magazine into and out of the storage area of the article handling apparatus.
- 10 15. The apparatus of any preceding claim, further including standardized bin segments within the columns of the magazine.
- ~~16. The apparatus of claim 15, wherein the resizing means is integrally formed with the segments~~
- 15 17. The apparatus of claim 15, wherein the resizing means comprises an insert (such as an extruded profile), which when inserted into the segments, changes the interior shape/size thereof, to accommodate differently sized (i.e., length, height and width) articles.
- 20 18. An article handling apparatus having a removable article storage structure which includes:
- a. a guidance apparatus adapted for individually guiding pre-packaged groups of articles to be handled, i.e., article storage cartridges, so as to form therewith a plurality of axially aligned article storage columns; the guidance apparatus including,
 - 25 b. a receiving device which provides individual coupling to the article storage cartridges, so as to allow grouping of the article storage cartridges into the plurality of axially aligned article storage columns.
19. Once received, the cartridges are individually guided by the guidance apparatus from one end of the column, along the longitudinal axis of the column, in a direction toward an article grasping portion of the article handling apparatus which is adjacent an opposed end of the column.
- 30 20. The guidance apparatus may additionally include a mechanism that co-acts with the cartridges so as to help enforce a FIFO ordering of the cartridges in the column.
- 35 21. Wherein the guidance apparatus groups the article storage cartridges into a matrix that is at least one article storage column deep and at least two article storage columns long, and where the receiving devices are positioned at outwardly facing opposed sides of the two article storage columns which form the depth of the article storage matrix.
- 40 22. Wherein the removable article storage structure comprises a refillable article storage magazine having a bottom portion and an elongated upper portion supported by the bottom portion for providing the guidance apparatus.
- 45 23. The apparatus of claim 22, wherein the upper portion may comprise an intersecting arrangement of walls or dividers, arranged so as to form a matrix of columns.

24. The apparatus of any preceding claim, wherein the guidance structure (upper portion for Claim 23) comprises a track guidance apparatus mounted to extend in the columnar direction from the bottom portion of the article storage structure.
- 5 25. The apparatus of claim 24, wherein the track guidance apparatus is free-standing in its extension from the bottom portion.
- 10 26. The apparatus of claim 24, wherein the track guidance apparatus is attached to walls that extend up from the bottom portion in the columnar direction.
- 15 27. The apparatus of claim 24, wherein the guidance apparatus is formed on the walls of the individual article storage cartridges themselves, so that an interlocking of the article storage cartridges with adjacent article storage cartridges provides the grouping of the article storage cartridges into the plurality of axially aligned article storage columns.
- 20 28. The apparatus of any preceding claim, wherein the receiving devices comprise magnetic couplings that slide on the guidance apparatus.
- 25 29. The apparatus of any preceding claim, wherein the receiving devices comprise openings near the bottom of the guidance apparatus, which openings provide access for respective ones of the article storage cartridges to be admitted into respective ones of the plurality of axially aligned article storage columns.
- 30 30. The apparatus of any preceding claim, wherein the removable article storage structure comprises a refillable article storage magazine having a 2 by 1+N matrix (where N= 0 or a positive integer), and the openings comprise openings in the bottom of opposed sidewalls that are used to form an outside perimeter for the magazine.
- 35 31. The apparatus of any preceding claim, wherein the removable article storage structure comprises a refillable article storage magazine having a 2 by 1+N matrix (where N= 0 or a positive integer), and the openings comprise openings in the bottom floor of the magazine.
- 40 31. The apparatus of any preceding claim, wherein the guidance apparatus comprises a track guidance apparatus, the tracks have an opening which allows a tab portion of the cartridges to be inserted therein so as to securely engage the guidance apparatus and thereby form the columnar arrangement of stored articles.
- 45 32. The apparatus of any preceding claim, wherein the magazine comprises a skeleton having a shape sufficient to position the cartridges into the columnar matrix arrangement.
33. The apparatus of claim 32, wherein the skeleton is formed from intersecting walls which create article storage columns on either side of the intersection, and a plurality of axially aligned tracks adapted to engage the article storage cartridges can be provided along each column.

34. The apparatus of any preceding claim, the magazine includes a bottom portion that functions to facilitate sliding movement of the magazine into and out of the storage area of the article handling apparatus.
- 5 35. The apparatus of any preceding claim, wherein the bottom sled portion comprises a substantially unitary construction, such as a U-shape, where opposed sidewalls of the U-shape provide smaller length side walls of a rectangular cross-section for the magazine, and the space between the opposed sidewalls comprise a longer dimension of the rectangular cross-section of the magazine.
- 10 36. The apparatus of claim 35, wherein the space between the opposed sidewalls provides the access opening for the article storage cartridges.
- 15 37. The apparatus of claim 36, wherein support beams along the longer dimension of the cross-section are used to join the opposed sidewalls, and are positioned at a height above the bottom portion of the U-shape so as to define a height for the access opening.
- 20 38. The apparatus of any preceding claim, wherein the internal and external wall portions used for constructing the upper body are formed using a low-cost corrugated material, such as corrugated paper or corrugated plastic.
- 25 39. The apparatus of any preceding claim, wherein corrugated plastic material is used to form the article storage cartridges, and further including reinforcement rods appropriately positioned within selected ones of the corrugations for further strengthening the shape of the article storage cartridges.
- 30 40. The apparatus of claim 39, wherein the reinforcement rod is aligned with a window in the sidewall of the cartridge is used as an attachment point for structures to be positioned inside the cartridges, such as an auxiliary strip which provides a plurality of article supporting flaps inside the cartridge, or a spacer which customizes the interior cross-section of the cartridge so that it more accurately positions and/or fits the particular shape of a particular article to be stored therein.
- 35 41. The apparatus of any preceding claim, wherein the bottom portion of the sled also includes a keying apparatus such as tabs, which mates with a corresponding keying apparatus, such as slots, in the storage area of the article handling apparatus to insure proper positioning/repositioning of the magazine within the storage area of the article handling machine.
- 40 42. The apparatus of any preceding claim, further including with the article handler a replaceable graphics display panel, said display panel being used in conjunction with "keying" aspects of the removable article storage structure, so as to further enhance/enforce "brand loyalty".
- 45 43. The apparatus of claim 42, wherein a unique ID (such as a bar code) associated with the replaceable graphics display panel can be sensed, for example by a bar code scanner, so as to

inform a controller of the article handler what articles are to be handled, and which columns they are stored in.

5 44. The apparatus of any preceding claim, wherein the article storage apparatus includes a unique ID (such as a bar code) which can be sensed so as to inform the controller what articles are stored therein, and which columns they are stored in.

10 45. The apparatus of any preceding claim, wherein said sensed ID is used , in conjunction with the "keying" aspects of the removable article storage structure, to auto-program the controller of the article handler.

15 46. The apparatus of claim 45, wherein the bottom portion of the sled also includes additional keying means, such as slots, for facilitating the positioning of wall portions for manufacturing the article storage column portions of the magazine.

20 47. The apparatus of any preceding claim, wherein the bottom portion of the sled also includes a detent/retaining clip apparatus for retaining an article storage cartridge after it has been inserted into the bottom portion of an article storage column via an access opening at the bottom of the magazine.